

Chemical Dust Control, Soil Stabilization, Erosion and Sediment Control

An Overview of Chemical
Products Utilized For Dust
Control, Soil Stabilization,
Erosion and Sediment Control

Presented By: Marty Koether

EarthCare Consultants, LLC.

Soil Stabilization and Dust Control Chemicals: What is the Best Choice?

- This presentation offers information on current chemical technologies in use, for the control of PM₁₀ Fugitive Dust, Erosion/Sediment Control and Soil Stabilization
- The purpose of this presentation is to aid you in your approach to using chemicals for controlling PM₁₀ fugitive dust, cost effectively, without contributing adversely to the environment.

Marty Koether

EarthCare Consultants, LLC.

Dust Control Products

- Current Technologies
- Environmental Aspects of Products
- Product Evaluations
- Specifications in Use
- Performance Criteria
- Case Histories



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Dust Control Program

Health & Safety
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Environmental and Health Information On Dust Palliatives for the Unpaved Roads Demonstration Project

Below are links to additional information about these specific products and general information about dust palliatives. If after reviewing this information, you still have unanswered questions, please contact Larry Person at (480) 312-7889 or by [e-mail](#).

Dust Palliative Products

[Pennzsuppress D](#)
[Asphotac](#)
[Topein](#)
[Dustac](#)
[SoilShield-LS](#)
[Soil Sement](#)
[DustShield](#)
[EnviroKleen](#)

Occupational Safety and Health Administration (OSHA) required technical specification for each of these dust palliative product.

[Dust Palliative Fact Sheet](#)

Washington State Department of Ecology Pollution Prevention

[Particulate Pollution Web Site](#)

Maricopa County Environmental Services Division
Particulate Pollution information site

Spokane County Data

Controlling Dust In Spokane County



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The Spokane County Air Pollution Control Authority (SCAPCA) wants to help you comply with air quality regulations by increasing awareness of the requirements. The intent of this page is to help you understand the air quality regulations associated with dust control.

Numerous industrial processes and non-industrial activities (i.e., construction, landscaping, material handling, road and lot cleaning, etc.) create dust and nuisance. Various dust control techniques are recommended for these different activities. The following information will help you understand how you can reduce air pollution, improve your working conditions, comply with the law and avoid penalties.

What Is Dust?

SCAPCA regulations define particulate matter as "any airborne finely divided solid or liquid material with a diameter smaller than 100 micrometers." Dust and smoke are the two major components of particulate matter.

Examples of dust include dirt, sawdust, paint overspray, and dry/powdered materials. These materials come from various sources, including, but not limited to, various industrial processes, paved and unpaved roadways, construction and demolition sites, parking lots, storage piles, handling and transfer of materials, and open areas.

Dust Control Products

- Water
- Chlorides
- Lignosulfonates
- Acrylic Copolymers
- Asphalt Emulsions
- Synthetic Oils
- Resins
- What is the safest and most effective product for your needs?

Water

- Readily available
- Inexpensive initial cost
- Longevity
- Track out
- Erosion
- Long term results
- Environmental impact
- Many regions experiencing shortage of water for construction and dust control on construction sites

Water

Types and Brand Names	Performance Advantages	Performance Limitations	Environmental Considerations
Freshwater	Usually readily available, low material cost, easy to apply.	Frequent light applications may be necessary during hot, dry weather; therefore, potentially labor intensive. Over application may result in loss of traction, erosion, or points of road failure.	Minimal environmental hazard. If applied excessively, may result in tracking onto paved roadways requiring prompt cleanup. Supply may be limited in some areas.

Chlorides

- Inexpensive initial cost
- Hygroscopic
- Water soluble after application
- Effects on Vegetation
- Effects on Wildlife
- Effects on application equipment
- Environmental impact of long term use
- Long term results negligible in Arid and Semi-Arid regions

Calcium Chlorides

Calcium chloride (Generically available as flakes or pellets)	Reduces evaporation rate of surface moisture 3.4 times; lowers freezing point of water to -60 degrees F (30% solution) minimizing frost heave and reducing freeze-thaw cycles; increases compacted density of road material; effectiveness retained after reblading.	Effectiveness in arid and semi-arid regions may be limited due to low relative humidity; very corrosive to aluminum alloys; slightly corrosive to steel. Solubility results in leaching during heavy precipitation. Releases heat when mixed in water.	Repeated applications and long-term use may harm adjacent and nearby vegetation. (Call the Department of Ecology at 360-407-6700 for listing of dust suppressant product vendors with additional product-specific information.)
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Magnesium Chlorides

Magnesium chloride: -DustGard -Dust-Off	Reduces evaporation rate of surface moisture 3.1 times, lowers freezing point of water to -27 degree F (22% solution) minimizing frost heave and reducing freeze-thaw cycles; increases compacted density of road material, more so than CaCl ₂ ; effectiveness retained after reblading.	Effectiveness in arid and semi-arid regions may be limited due to low relative humidity; very corrosive to steel, though inhibitions can be added. Solubility results in leaching during heavy precipitation.	Repeated applications and long-term use may harm adjacent and nearby vegetation. (Call the Department of Ecology at 360-407-6700 for listing of dust suppressant product vendors with additional product-specific information.)
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Lignosulfonates

- Inexpensive initial cost
- Water soluble
- Track out
- High sulfur content
- Questionable environmental impact
- Long term results negligible
- “Spent Pulping Liquor” is a By-product of the pulp paper industry
- New EPA Controls being mandated for Spent Pulping Liquor spills

Lignosulfonates

Lignin derivatives: -Dustac (Lignosite) -Road Binder	Greatly increases dry strength of soil; not humidity-dependent; imparts some plasticity to road surfaces; lowers freezing point of road surface and base, effectiveness retained after reblading.	High solubility results in leaching during heavy precipitation, corrosive to aluminum alloys due to acidity (CaCO_3 added ingredient, can neutralize acidity). Proper aggregate mix (4-8% fines) important to performance. Becomes slippery when wet, brittle when dry.	Lignin products have a high BOD (biological oxygen demand) in aquatic systems. Spills or runoff into surface or groundwater's may create low dissolved oxygen conditions resulting in fish kills or increases in groundwater concentrations of iron, sulfur compounds, and other pollutants. (Call the Department of Ecology at 360-407-6700 for listing of dust suppressant product vendors with additional product-specific information.)
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Polymer Emulsions

- More expensive initial application
- Water insoluble after application
- Leaves soils treated looking natural
- Many have no environmental impact
- Hold up to heavy traffic
- Long term results when properly applied provide excellent life cycle costs
- Highly versatile product with many various uses

Polymer Emulsions

Synthetic Polymer Emulsions: -Soil Sement, Soil Seal -Top Seal (Dust-Seal) -ECO-CF (Sand Glue) -Soil Master WR-RSB -Aerospray 70A -Marloc	Applicable to a range of emission sources; functions well in sandy soil conditions. Some types allow seeded vegetation to grow through the polymer matrix.	Requires proper weather conditions and time to cure, may be subject to UV (sunlight) degradation; application equipment requires timely cleaning; no residual effectiveness after reblading.	(Call the Department of Ecology at 360-407-6700 for listing of dust suppressant product vendors with additional product-specific information.)
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Asphalt Emulsions

- More expensive initial application
- Timely application methods
- Lack aesthetics in natural settings
- Subject to pot holes
- Environmental impact

Asphalt Emulsions

Bitumens, Tars, and Resins:

- Residual Fuel Oil
- Technical White Oils
- Fuel oils #4, #5, #6
- Coherex, Asphotac
- DL-10, CSS-1, CMS-2S
- Arcadia oil, PEP
- Pennzsuppress D

Water insoluble when dry; provides a degree of surface waterproofing. Good residual effectiveness.

Surface crusting, fracturing and potholing may develop; long-term application may cause road to become too hard for reblading; won't lower freezing point; petroleum oil products lack adhesive characteristics.

Use of used oils is prohibited. Some petroleum-based products may contain carcinogenic polycyclic aromatic hydrocarbons (PAHs). (Call the Department of Ecology at 360-407-6700 for listing of dust suppressant product vendors with additional product-specific information.)

Synthetic Oils

- New Technology
- Ideal for intense use areas
- Work with “worst case” soils
- Environmentally safe
- Applied “neat” requiring no water for application
- Immediate results with no interruption of traffic or use of area

Tree Resins

Tree Resin Emulsions:

- Road Oil - Enduraseal200 (ENTAC)
- Dustbinder
- DustControlE (RESTAC)
- Dustrol EX (J-30EX)

Low solubility after curing, minimizes leaching and provides degree of surface waterproofing. Imparts some plasticity to road surfaces. High bonding strength; non-corrosive.

Requires proper weather and time to cure. No residual effectiveness after reblading. Equipment requires prompt cleanup to avoid curing of resin in hoses and pipes.

(Call the Department of Ecology at 360-407-6700 for listing of dust suppressant product vendors with additional product-specific information.)

ABOUT THE CHEMICALS | Basic Testing to Identify Chemical Hazards[Home](#)[Find Your Community](#)[What's New](#)[Setting Priorities](#)[Pollution Locator](#)[Pollution Rankings](#)[About the Chemicals](#)[Health Effects](#)[Regulatory Controls](#)[Discussion Forums](#)[FAQs](#)[Personalize Scorecard](#)[Glossary](#)[About the Scorecard](#)[Search Scorecard](#)
Go[Search Tips](#)**Chemical:** [SPENT PULPING LIQUOR](#)**CAS Number:** 66071-92-9

The U.S. EPA conducted a comprehensive review of publicly available chemical testing data in 1997 to examine whether the basic information needed to identify chemical hazards is available for [high production volume chemicals](#). EPA searched major chemical databases to determine if the following tests had been conducted on a chemical:

- Acute toxicity
- Chronic toxicity
- Neurotoxicity
- Developmental or reproductive toxicity
- Mutagenicity
- Carcinogenicity
- Ecotoxicity
- Environmental fate

The following basic tests to identify chemical hazards have either not been conducted or are not publicly available:

- Acute toxicity
- Carcinogenicity
- Chronic toxicity
- Developmental or reproductive toxicity
- Ecotoxicity
- Environmental fate
- Mutagenicity
- Neurotoxicity

[More on the importance of basic toxicity testing](#)

ABOUT THE CHEMICALS | The Importance of Basic Toxicity Testing

Basic screening-level toxicity information is needed to identify potential environmental hazards. Without such information, we have no way of knowing whether chemical releases or exposures can harm human or ecological health.

There is growing agreement that too many chemicals in widespread commercial use lack basic toxicity testing data. EPA's effort to evaluate the testing status of chemicals is part of an [international effort to identify data poor chemicals](#) being conducted by the Organization for Economic Co- operation and Development (OECD). EPA evaluated 2,863 high production volume chemicals and found that only 7% (just 202 chemicals) had publicly available results for all eight basic tests. Almost half of these chemicals (43%) had no data in any test category.

EPA's findings confirm and extend the findings of EDF's 1997 report [Toxic Ignorance](#). Based on a random sample of 100 U.S. high production volume chemicals, EDF found that nearly 75% of these chemicals lack the basic data required for human health hazard identification.

The OECD has established an internationally agreed upon set of basic tests that should be conducted on chemicals, the [Screening Information Data Set \(SIDS\)](#). EDF utilized the human health components of SIDS in *Toxic Ignorance*. EPA utilized a modified version of SIDS in its evaluation (EPA credited a chemical with SIDS data if any study relevant to an endpoint could be found, although completing the SIDS set for these endpoints requires multiple studies).

The OECD uses its set of screening tests to identify chemicals that require additional testing, and then member countries volunteer to fill these data gaps. An overview of OECD's SIDS program is available at <http://www.epa.gov/opptintr/sids/overview.htm>.

Once basic testing is completed, an initial assessment of chemical hazards is prepared, which may then lead to further toxicity studies or to actions that reduce risks. OECD has published assessments on 34 chemicals, available at <http://irptc.unep.ch/irptc/sids/sidspub.html>. EPA has compiled SIDS dossiers and assessments on nine chemicals, available at <http://www.epa.gov/opptintr/sids/chemlist.htm>.

Home

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What's New

Setting Priorities

Pollution Locator

Pollution Rankings

About the Chemicals

Health Effects

Regulatory Controls

Discussion Forums

FAQs

Personalize Scorecard

Glossary

About the Scorecard

Search Scorecard

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ABOUT THE CHEMICALS

National Safety Assessment Data

Chemical:

SPENT PULPING LIQUOR

CAS Number:

66071-92-9

Risk Assessment Values or Standards

	Value	Units Reference
Inhalation cancer risk value (potency)	Not a recognized or suspect carcinogen	
Inhalation noncancer risk value (reference concentration)	Data gap	
National ambient air quality standard	Gap in regulatory coverage	
Ingestion cancer risk value (potency)	Not a recognized or suspect carcinogen	
Ingestion noncancer risk value (reference dose)	Data gap	
National water quality standard	Gap in regulatory coverage	

Available Exposure Data

Media

No monitoring data available in any media

References

NA

See [the data Scorecard possesses for safety assessment.](#)

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Go[Search Tips](#)Chemical: SPENT PULPING LIQUOR

CAS Number: 66071-92-9

Are [Risk Assessment Values](#) Available?

Health Risk of Concern

Inhalation

Ingestion

Cancer

Not a recognized carcinogen

Not a recognized carcinogen

Noncancer

No

No

Are [Exposure Data](#) Available?

Type of Exposure

Inhalation - ambient air

No

Inhalation - indoor air

No

Ingestion

No

- See [the data US EPA possesses for safety assessment.](#)

A. GENERAL INFORMATION

Trade Name (Common Name)

RB Ultra Plus™

CAS Registry No.

66071 92-9

Chemical Name and/or Synonym

Ammonium Lignosulfonate, Proprietary Agricultural Additives

Chemical Family

Spent Sulfite Liquors

J. ADDITIONAL INFORMATION

Though many toxicological studies have been performed over the years, no known toxic or hazardous effects of lignosulfonates have been established.

Use of lignosulfonates in animal feed and other food related applications is approved by the US FDA and Agriculture Canada. Use as a pelleting aid for animal feed, in boiler water treatment, sealing gaskets for food containers, etc. is indicated in Title 21 of the code of regulations of the US FDA.

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RB Ultra Plus®

Material Safety Data Sheet

Product Identification

Ingredients

Health Effect Information

Emergency & First Aid Procedure

Personal Health Protection Information

Fire Protection Information

Reactivity Data

Environmental Precautions

Miscellaneous

Physical Properties

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Another Quality Product Of Pennzoil Products Company

PM10 DUST CONTROL

AND MEASUREMENT

MAR 26 '97

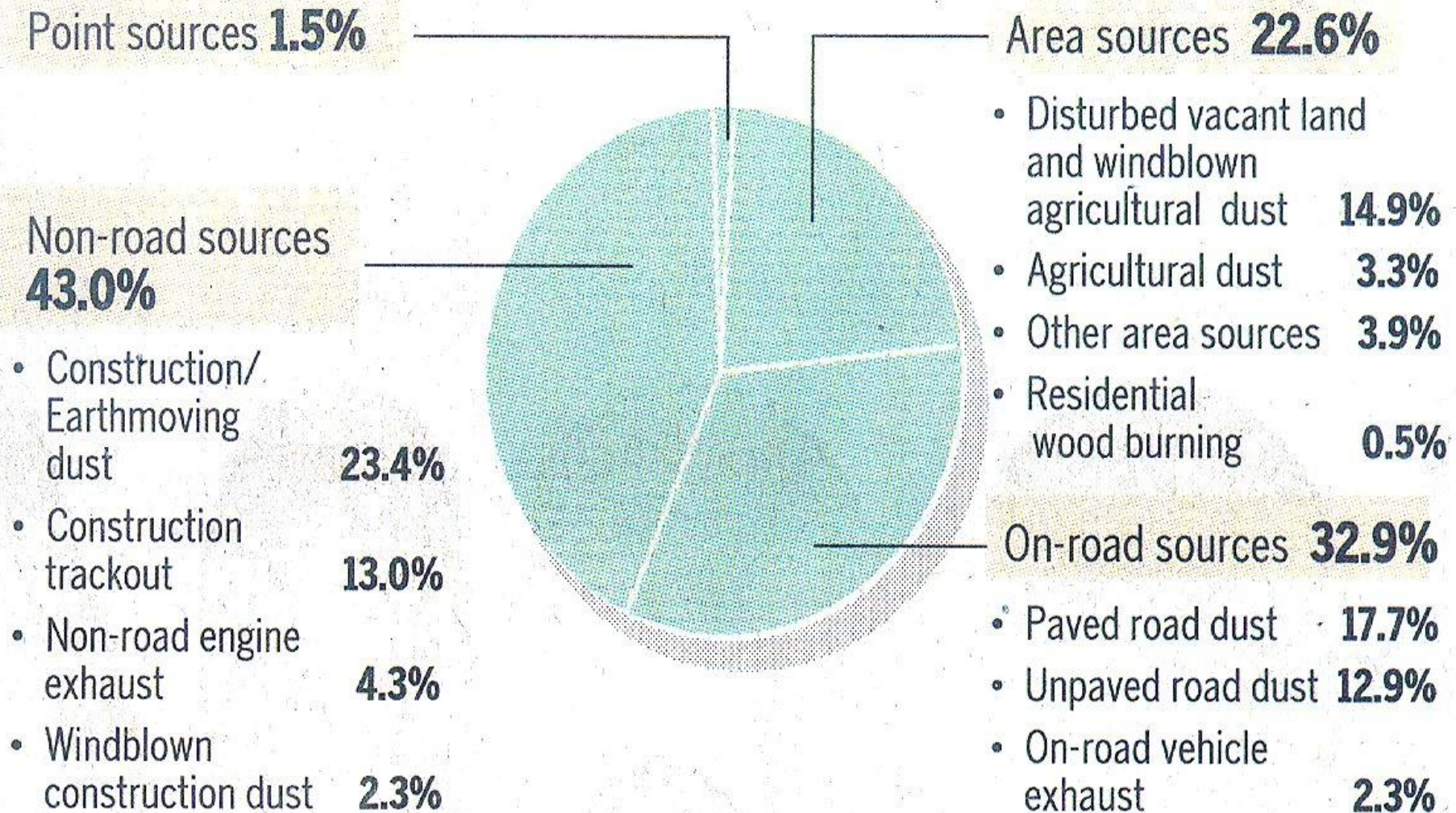
PM-10 NON-ATTAINMENT AREA



MCDOT

Sources of particulate pollution

Percentage total regional emissions, 1995.



Source: Maricopa Association of Governments

MCDOT Dust Study Measuring Device

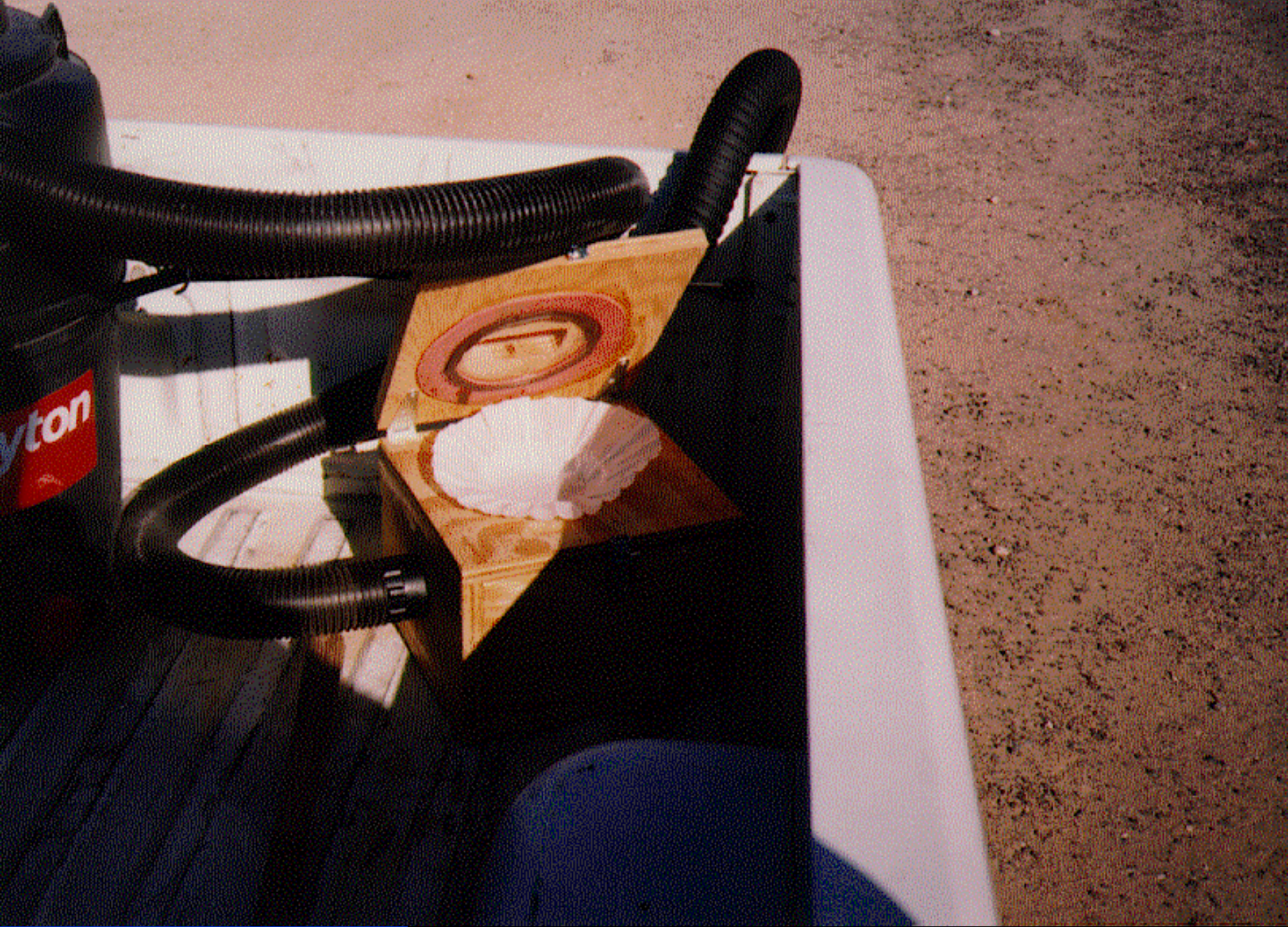


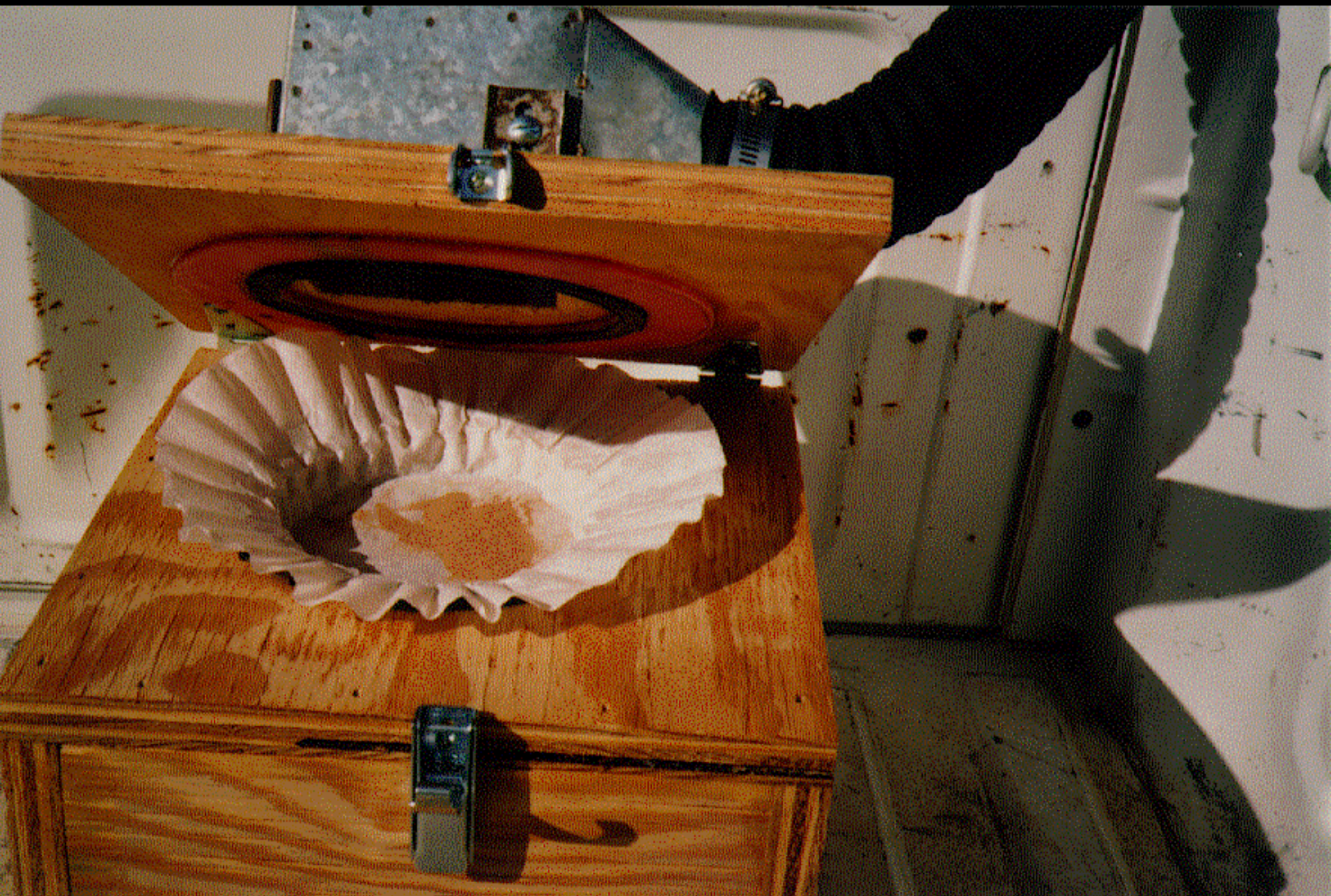
MCDOT Dust Study Measuring Device Vehicle Mounted













AGRA Earth & Environmental

PROJECT: ON-CALL CONSTRUCTION CY1995-4
 LOCATION: MARICOPA COUNTY, AZ
 MATERIAL: DUST
 SAMPLE: ROAD

JOB NO: FT95-3392
 WORK ORDER NO:
 LAB NO:
 DATE SAMPLED:

HYDROMETER TEST REPORT (ASTM D-422)

WEIGHT OF SAMPLE DISPERSED 49.07 SPECIFIC GRAVITY OF SOLIDS 2.74
 PERCENT PASSING #10 SIEVE 100

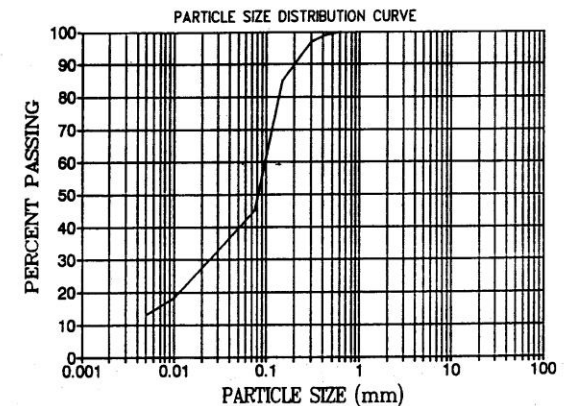
PARTICLE SIZE (DIA. mm)	HYDROMETER RESULTS							
	0.0755	0.0556	0.0362	0.0212	0.0151	0.0107	0.0075	0.00425
PERCENT SAMPLE TESTED	48.6	36.9	28.0	23.1	21.1	19.2	10.2	9.2
PERCENT TOTAL SAMPLE	48.6	36.9	28.0	23.1	21.1	19.2	10.2	9.2

FULL SIEVE ANALYSIS
 MECHANICAL SIEVE & HYDROMETER
 (% PASSING)

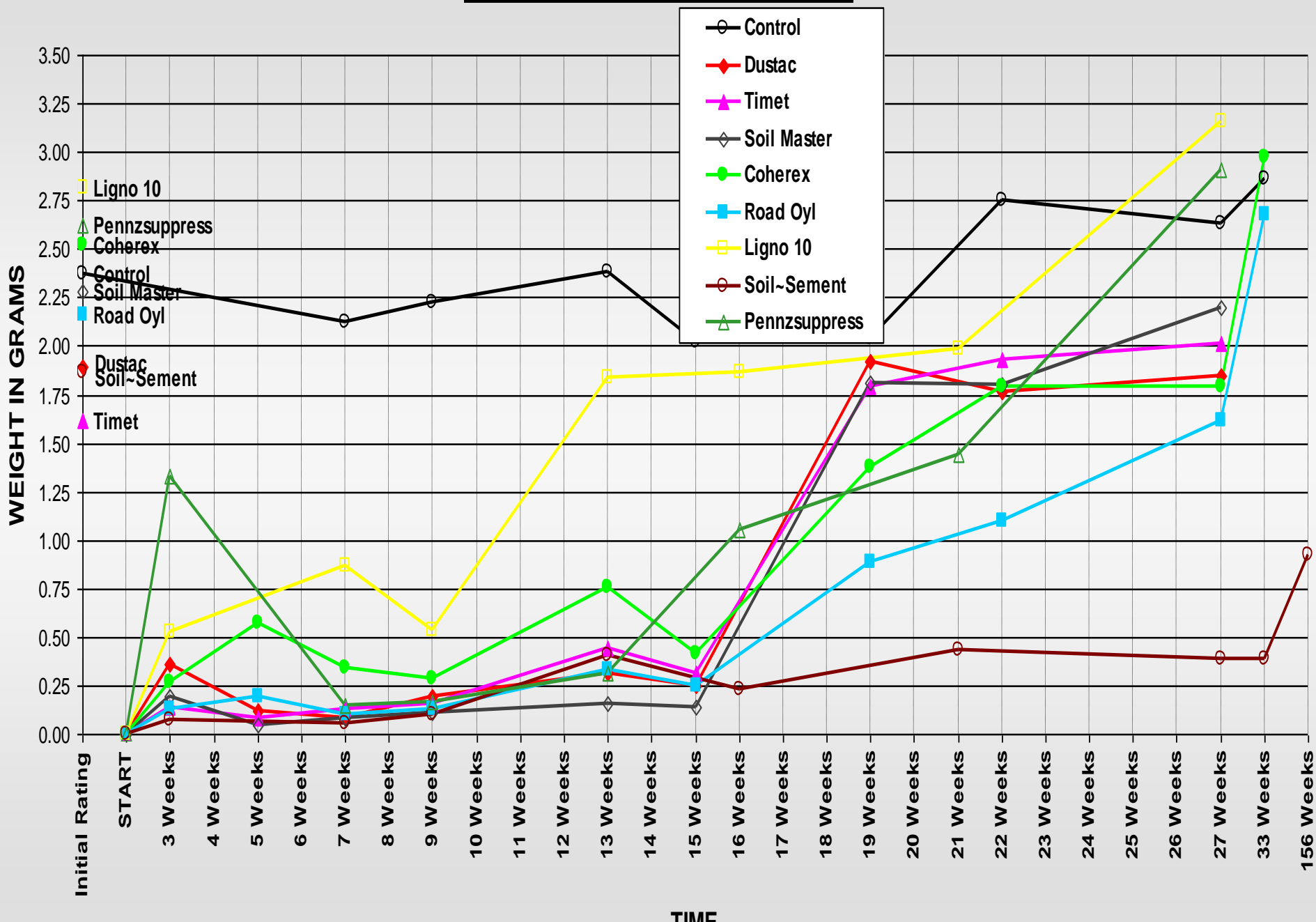
MECHANICAL SIEVE ANALYSIS AFTER HYDROMETER (% PASSING)

#200	#100	#50	#40	#30	#16	#10
45	85	97	99	100	100	100

3 IN	100
2 IN	100
1 1/2 IN	100
1 IN	100
3/4 IN	100
1/2 IN	100
3/8 IN	100
1/4 IN	100
# 4	100
# 8	100
# 10	100
# 16	100
# 30	100
# 40	99
# 50	97
# 100	85
# 200 (slit)	45
.010 mm	18
.005 mm (clay)	13



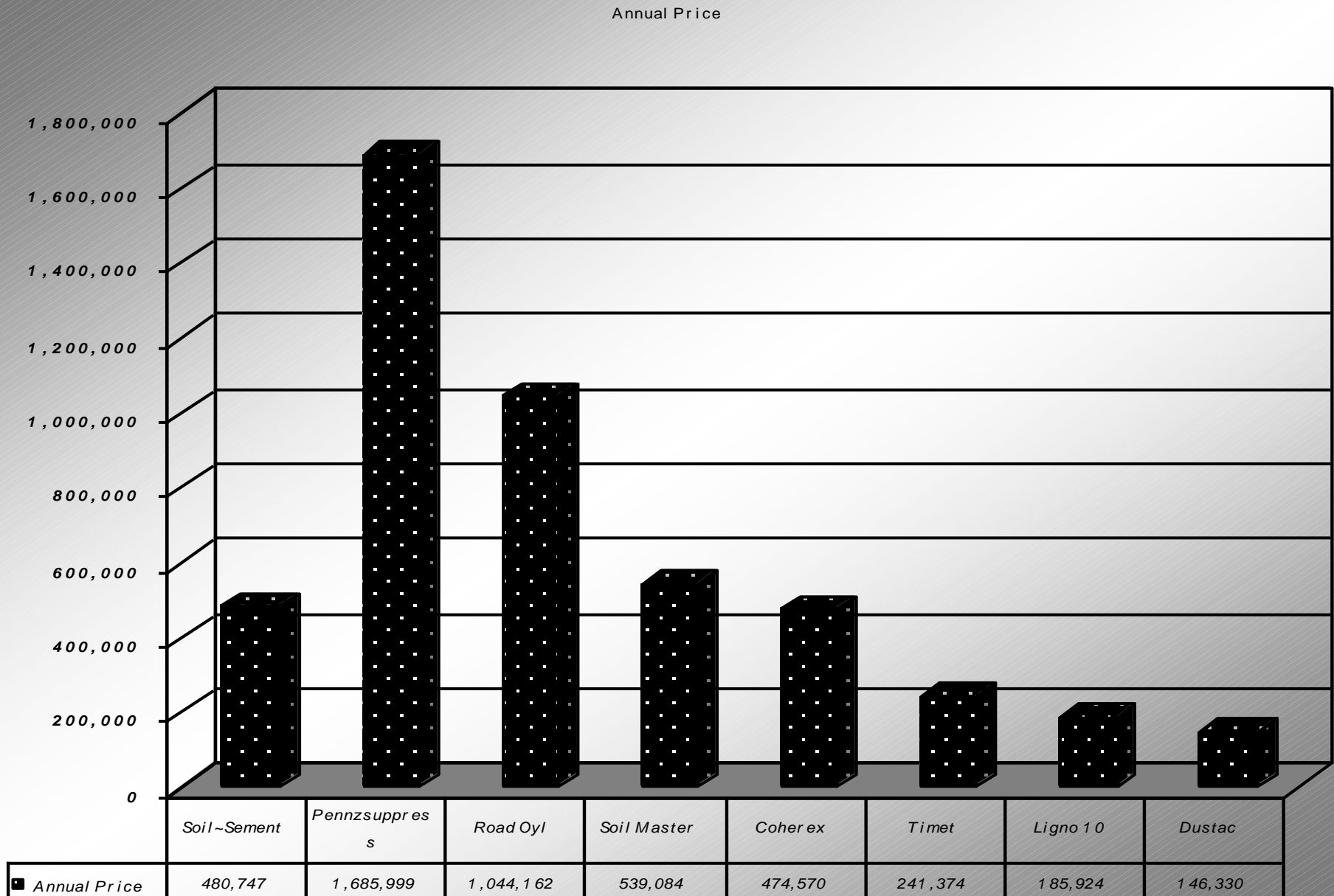
DUST COLLECTED BY WEIGHT



MCDOT COST ESTIMATES

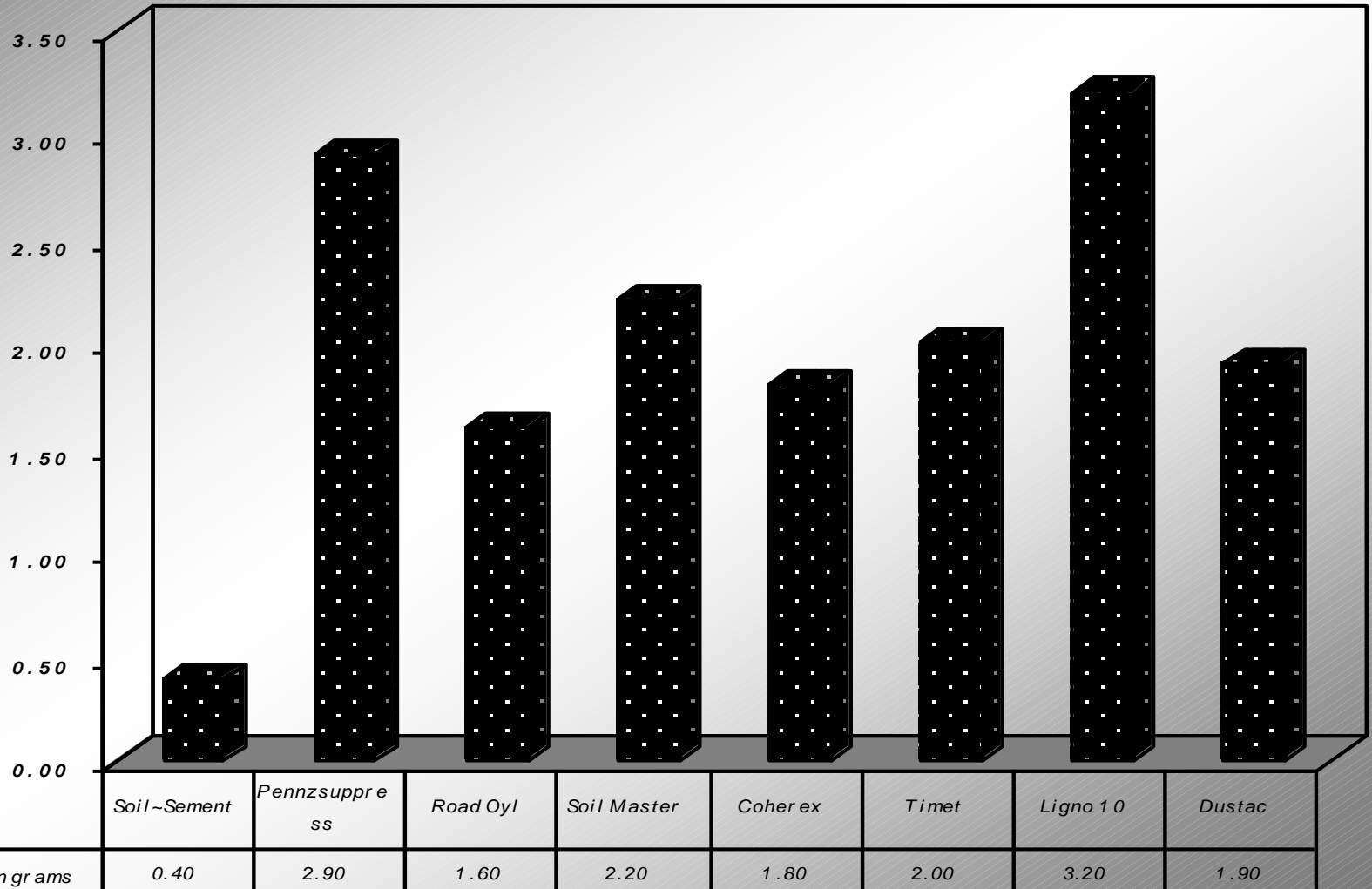
DUST PALLIATIVES	PRODUCT APPLICATION PER MILE (Both Shoulders / 6 Feet / 7040 Square Yards)						TOTAL COST @ 121.37 Miles		
Product Names	Product Cost (\$) product concentrate	Total Product gallons concentrate	Total Liquid diluted gallons	Delivery Charge 30 miles Radius	Application Charge 2 hours on site	Total Cost per Mile + Tax (7.05%)	Application Frequency per Year	Total Cost per Year / per Mile	Total Cost per Year
Soil~Sement	\$3.20	1151.74	11,517.4	\$0.00	\$0.00	\$3,945.40	1	\$3,945.40	\$478,853.26
Dustac	\$0.77	220	1760	\$54.98	\$150.00	\$400.30	3	\$1,200.91	\$145,754.24
Timet	\$0.23	1760	1760	\$54.98	\$150.00	\$660.31	3	\$1,980.92	\$240,423.95
Soil Master	\$7.25	158.4	2534.4	\$79.20	\$150.00	\$1,474.72	3	\$4,424.16	\$536,960.59
Coherex	\$1.30	704	3520	\$127.54	\$170.00	\$1,298.24	3	\$3,894.71	\$472,701.50
Road Oyl	\$2.09	1056	6336	\$261.26	\$200.00	\$2,856.42	3	\$8,569.25	\$1,040,049.32
Pennzsuppress D	\$3.60	1196.8	9574.4	\$0.00	\$0.00	\$4,612.23	3	\$13,836.68	\$1,679,358.28
Ligno 10	\$0.43	352	1760	\$54.98	\$150.00	\$381.46	4	\$1,525.85	\$185,192.16
NOTES:									
Total Miles = All Major and Minor Arterial Roads (Class 3, 4, 8, and 9) within Maricopa County's Non-Attainment Area									
All Total Costs = Dust Palliative Delivered and Applied by Vendor									

Annual Costs Per MCDOT STUDY

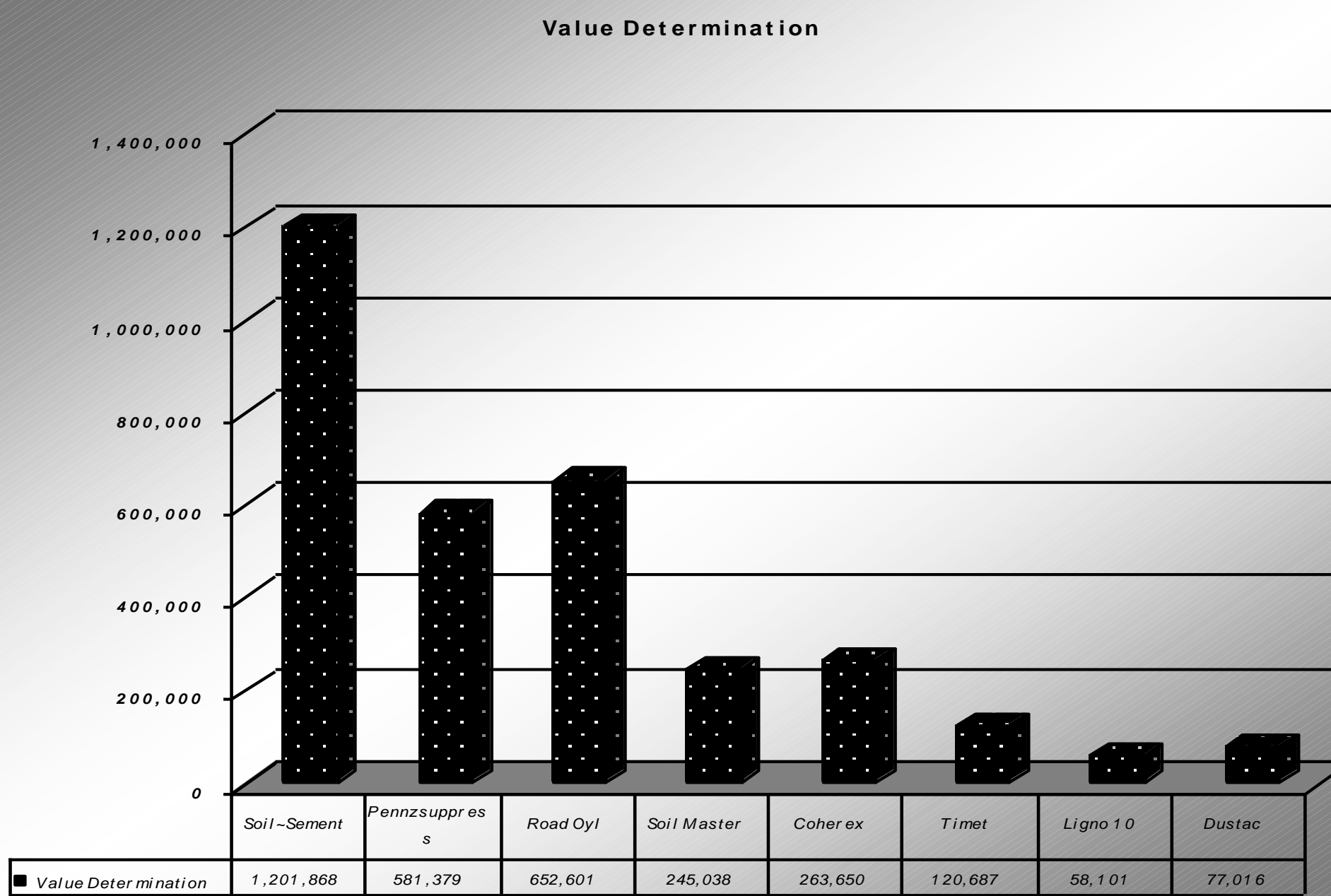


Dust Collected 27th Week Runs

Dust Collected/ wt. in grams

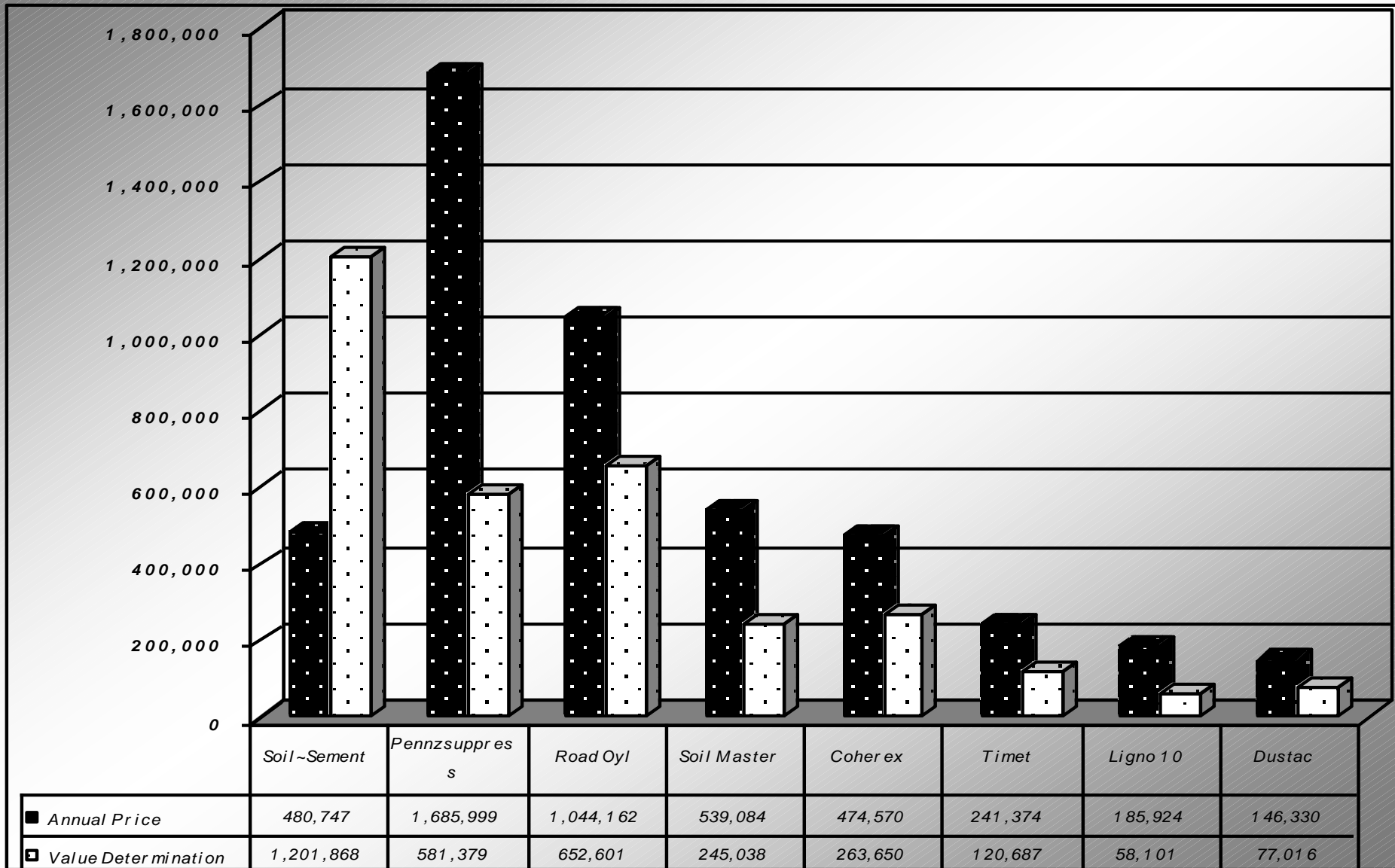


Value Determination: Cost Divided by Grams Collected

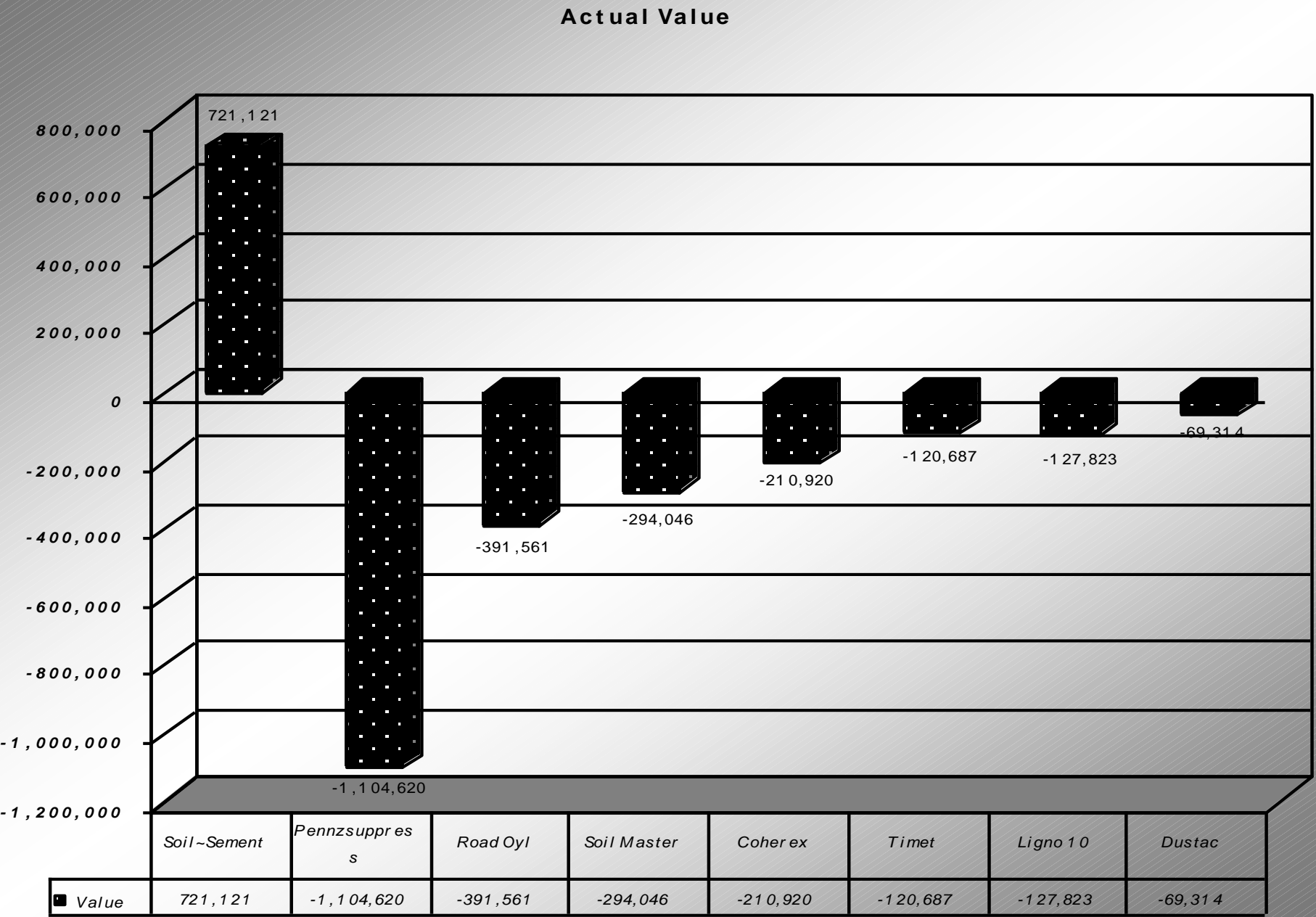


Price Vs Value Determination

Price vs Value Determination



Actual Value = Value Determination Minus The Price



Product Performance Specifications

Soil Stabilizer: Vendor shall submit test results (report) with the bid from an independent AASHTO accredited lab, signed and sealed by a Professional Engineer, registered in the state of Arizona, showing the CBR value of untreated A-7 soil from Maricopa County and CBR values of that same soil at the optimum stabilizer content. Results of treated soil should show a minimum 25% increase in CBR value over the untreated soil. The test method used shall be a modified version of ASTM D1883 Test Method for CBR(California Bearing Ratio) of Laboratory Compacted Samples. The following curing modification shall be used:

Curing - CBR specimens, after molding, shall be left in their mold, on their sides and cured in laboratory air for 7 days prior to being immersed in water for 96 hours and then tested for CBR.

Moisture Content - CBR samples shall be compacted at the optimum moisture content, both treated and untreated (ASTM D698, method C). Three specimen average required. Surcharge weight shall be 10 lbs.

Report - shall include all the information required by ASTM D1883, Section 10.0 for both treated and untreated CBR samples. In addition, the penetration vs. stress plots for each test shall be included (ASTM D1883, Fig. 2).

Environmental Criteria For Specifications

2.2.8 ENVIRONMENTAL CRITERIA:

Environmental Criteria: Products shall not contain or emit chlorinated fluorocarbons (CFSs Freons) or volatile organic compounds (VOCs).

HMIS rating shall be equal to or less than for each category: H=1; F=I; R=1; PPE=X.

Contractor shall provide a copy of the current Material Safety Data Sheet (MSDS) for each product proposed for use. The MSDS must include all chemical compounds present in concentrations greater than 0.1 % .

Contractor shall provide certification that storm water runoff from treated areas (as a result of application of the Acrylic Copolymer Dust Palliative/Stabilizer) will not contain concentrations that exceed water quality benchmark values of the parameters designated in Table 1 below (Source: Table 5 of the National Pollutant Discharge Elimination System Storm Water Multi-Sector General Permit for Industrial Activities or the Arizona Surface Water Quality Numeric Standards as defined in the Arizona Administrative Code, Title 18, Chapter 11). This certification will be documented by all of the following methods:

- 1. Conduct aquatic toxicity testing and provide full test data results.**
- 2. Conduct specific surface water testing (runoff over treated area) or specific soil testing of treated soil.**
- 3. Provide complete and accurate listing of chemical constituents (by percentage and quantity) which make up the product. This must include all proprietary chemical information.**

Dust Control For Unpaved Roads Utilizing Soil~Sement®



Asphalt Millings Stabilized With Soil~Sement®



Asphalt Millings Stabilized With Soil~Sement®



Asphalt Millings Stabilized With Soil~Sement®



Asphalt Millings Stabilized With Soil~Sement®





Subgrade Stabilization



Pulverized Subgrade



Road Ready For Blending Soil~Sement[®] Into Subgrade



Soil~Sement® Application on Stabilized Subgrade



Finished Subgrade



Sheep's Foot Doesn't Damage Subgrade



Chipseal Over Soil~Sement®



Stabilization At Sky Harbor





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Stabilized Shoulder



Soil~Sement® Erosion Control



Soil~Sement® Un-Paved Parking Lots



Soil~Sement® Un-Paved Parking Lots





Event Parking Dust Control











Dust Control On Disturbed Areas







All products and vendor our not Equal

As with all vendors, be certain to check the experience record of the vendor/applicator and their References.

Be certain the products are safe for the environment...

All products and vendor our not Equal



All products and vendor our not Equal



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